

TECHNICAL MANUAL

FUELS FOR USAF AIRCRAFT

(ATOS)

F41608-84-D-A384

F41608-87-D-A288

Prepared By: Digital Data Support Group

This publication supersedes T.O. 42B1-1-14, dated 15 August 1979, which will be removed from active files.

DISTRIBUTION STATEMENT: Approved for public release; distribution is unlimited. Requests for this document must be referred to DET 3, WR-ALC/AFTT, 2430 C St, Bldg 70, Area B, Wright-Patterson AFB, OH 45433-7632.

HANDLING AND DESTRUCTION NOTICE: Handle in compliance with the distribution statement and destroy by any method that will prevent disclosure of the contents or reconstruction of the document.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original 0 15 April 2004

TOTAL NUMBER OF PAGES IN THIS MANUAL IS 20, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
Title	0				
A	0				
i - iii	0				
iv Blank	0				
1-1 - 1-10	0				
2-1 - 2-2	0				
3-1	0				
3-2 Blank	0				

*Zero in this column indicates an original page

TABLE OF CONTENTS

Chapter	Page	Chapter	Page
LIST OF ILLUSTRATIONS	ii	1.7 Fuel Use Limitations	1-7
LIST OF TABLES	ii	1.8 Determination of Fuel Temperature	1-7
INTRODUCTION	iii	1.9 Commercial Turbine Engine Fuels	1-7
1 FUELS FOR USAF AIRCRAFT	1-1	1.10 Lubricity of Fuel	1-7
1.1 General	1-1	1.11 Fuel Mixing	1-7
1.2 Definitions	1-1	1.12 Use of Fuels Not Containing Fuel System Icing Inhibitor (FSII)	1-10
1.3 Reciprocating Engine-Powered Aircraft	1-1	1.13 Fuel Serviced under K INTO-PLANE Servicing Contracts	1-10
1.4 NATO Reciprocating Engine Fuels	1-2	2 FUELS FOR ARMY AIRCRAFT	2-1
1.5 Turbojet and Turboprop Aircraft	1-2	2.1 Purpose	2-1
1.6 Nato Turbine Engine Fuels	1-2	3 FUELS FOR NAVY AIRCRAFT	3-1
		3.1 Purpose	3-1

LIST OF ILLUSTRATIONS

Number	Title	Page	Number	Title	Page
1-1	Jet Fuel Mixture Freeze Point Charts	1-8	1-2	Stagnation Temperature Chart	1-9

LIST OF TABLES

Number	Title	Page	Number	Title	Page
1-1	Fuels for USAF Reciprocating Engine Aircraft	1-2	2-1	Fuels for Army Aircraft, Turbine Engines — Fixed Wing Aircraft	2-1
1-2	Fuels for USAF Turbojet and Turboprop Aircraft	1-3	2-2	Fuels for Army Aircraft, Turbine Engines — Rotary Wing Aircraft	2-2
1-3	Fuel Characteristics	1-6			

INTRODUCTION

1. PURPOSE.

The purpose of this manual is to designate the grades of fuel for use in USAF aircraft and to provide technical information on military and commercial aviation fuels.

2. SCOPE.

In case of conflict between this technical order and the aircraft flight manual, the aircraft flight manual shall take precedence. The System Program (SPO) or System Management Support Office will be contacted in regard to aircraft operations. In regards to fuel identification or fuel equivalency problems or questions, contact the Product Engineering Branch at: DET 3 WR-ALC/AFTT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB 45433-7632, DSN 785-8050.

3. RESPONSIBILITY.

- a. Pilots and/or crew chiefs are responsible for ascertaining the correct fuel required for individual

aircraft and for assuring that the aircraft is serviced with the correct fuel. If existing circumstances require the use of fuel other than the primary fuel, responsibility will extend to assuring the mechanical and operating adjustments are made as necessary, in consonance with criteria prescribed in appropriate aircraft/engine technical manuals.

- b. Storage of aviation fuel will be restricted to Grade 100/130 aviation gasoline and Grades JP-4 and JP-8 turbine fuel except in support of special projects. Requirements for storage of any other aviation fuel will be justified to the parent command headquarters. A copy of the justification will be furnished by mail or faxed to DET 3 WR-ALC/AFTT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB 45433-7632, DSN Fax: 785-8051 or Commercial: (937) 255-8051.

CHAPTER 1

FUELS FOR USAF AIRCRAFT

1.1 GENERAL.

Aircraft fuels may be classified under 4 general types: wide-cut type (JP-4 and Jet B), kerosene type (JP-8, Jet A-1, and Jet A), high flash point type (JP-5), and aviation gasoline. All 4 types may be utilized in turbojet and turboprop engines with certain restrictions. Only aviation gasoline, because of its high volatility and minimum octane requirements, is suitable for use in reciprocating engines. Some differentiating characteristics of aircraft fuels can be found in [Table 1-3](#).

- a. Wide-Cut Type – wide-cut fuels are mixtures of gasoline and kerosene distillate fractions with an approximate boiling range of 35° – 315°C (95° – 600°F).
- b. Kerosene Type – kerosene type fuels are petroleum distillates with an approximate boiling range of 165° – 290°C (330° – 550°F).
- c. High Flash Point Kerosene – high flash point kerosene fuel has essentially the same characteristics as the kerosene type fuels, but with a minimum flash point of 60°C (140°F). This higher flash point fuel is used to some extent in Presidential Fleet aircraft and is required by the Navy for fire safety purposes aboard aircraft carriers.
- d. Gasoline – gasoline is a petroleum distillate with an approximate boiling range of 35° – 165°C (95° – 330°F). Gasoline type fuels are not used to any large extent in aircraft turbojet and turboprop engines because of poor lubricating properties as compared to kerosene type fuels and because of lead additives which have an adverse effect on aircraft turbine engines.

1.2 DEFINITIONS.

- a. Primary Fuel – the fuel or fuels used during aircraft tests to demonstrate system performance (contract compliance) through the complete operating range for any steady state and transient operating condition.
- b. Alternate Fuel – a fuel authorized for continuous use. The operating limits, thrust outputs and thrust transients, shall not be adversely affected. The applicable aircraft flight manual shall define limitations, if any, of a significant nature on aircraft

performance parameters such as range, altitude, loiter time, or rate of climb, and engine performance parameters, such as specific fuel consumption or starting and stopping time. The use of an alternate fuel may result in a change of maintenance or overhaul cost. External engine trim adjustments may be necessary or desirable for use of an alternate fuel.

- c. Emergency Fuel – a fuel which may cause significant damage to the engine or other systems; therefore, its use shall be limited to 1 flight. The applicable aircraft flight manual or system manager should be consulted regarding operating restrictions and post-flight maintenance actions necessary when using an emergency fuel. Examples of conditions that might warrant use of emergency fuels are:
 1. Accomplishing an Important Military Mission
 2. Countering Enemy Actions
 3. Emergency Evacuation Flights
 4. Emergency Aerial Refueling

1.3 RECIPROCATING ENGINE-POWERED AIRCRAFT.

- a. [Table 1-1](#) designates the primary and alternate military fuels for reciprocating engines installed in USAF aircraft. See [Step b](#) for general instructions.
- b. Aircraft using a lower than specified grade of AVGAS must be operated In Accordance With (IAW) the power schedule or operating limits as indicated in applicable flight manuals. Engines using a higher than specified grade of fuel may develop spark plug fouling and require increased maintenance. Refer to flight manuals for spark plug anti-fouling procedures. Mixing different grades of AVGAS in aircraft tanks is permitted when necessary. The aircraft must be operated IAW limits established for the lower grade. Commercial Grade 100 (dyed green) or 100LL (low lead, dyed blue) may be used as an alternate when Grade 100/130 (dyed blue) is authorized in [Table 1-1](#). Power settings are the same as those established for 100/130.

Table 1-1. Fuels for USAF Reciprocating Engine Aircraft

Aircraft	Engine	Fuel	
		Primary	Alternate
C-7A	R-2000-7M2	100/130	115/145
KC-97L	R-4360-59B J47-GE-25/25A	100/130 JP-4	115/145 JP-8, 100/130, 115/145
C/EC-121C/G/S/T ¹	R-3350-93/93A	115/145	100/130
C/UC-123K	R-2800-99W J85-GE-17	100/130 100/130	115/145 115/145
C-131B/D/E	R-2800-103W	100/130	115/145
O-2A/B	I0-360-C/D	100/130	115/145
T-41A	O-300-D	80/87	100LL
T-41C/D	I0-360-D	100/130	115/145
RQ-1L	ROTAX 914 ²	100LL (ASTM D910)	NONE
MQ-1L	ROTAX 914 ²	100LL (ASTM D910)	NONE
¹ 115/145 will be used in C/EC-121 series aircraft to prevent engine performance degradation. ² ROTAX 914 engine is managed by PN not equipment designator UPA41040-2, UPA41040-3, UPA41040-4, UPA41040-5.			

1.4 NATO RECIPROCATING ENGINE FUELS.

In overseas areas, aviation gasolines may be identified by NATO symbol. To assure that the proper grade is serviced to aircraft, the NATO equivalents for grades under Specification MIL-G-5572 are provided as follows:

NATO Designation	Specification MIL-G-5572	Freeze Point
F-12	Grade 80/87	-60°C (-76°F)
F-18	Grade 100/130	-60°C (-76°F)
F-22	Grade 115/145	-60°C (-76°F)

1.5 TURBOJET AND TURBOPROP AIRCRAFT.

The primary alternate and emergency fuels for all turbojet and turboprop engines installed in USAF aircraft are listed in [Table 1-2](#). See Paragraph 1.2 for general definitions. As applied to turbojet and turboprop engines, the term AVGAS in [Table 1-2](#) refers to any grade of aviation gasoline.

1.6 NATO TURBINE ENGINE FUELS.**NOTE**

See [Table 1-1](#) for KC-97L and C-123K combinations (reciprocating and jet engines).

In overseas areas, turbine engine fuels may be identified by NATO symbol. To assure that the proper grade is serviced to the aircraft, these fuels are listed below:

NATO Symbol	Fuel Type	Military Specification or Commercial Equivalent
F-34*	Low-Flash Point Kerosene type	MIL-T-83133 Grade JP-8
F-35	Low-Flash Point Kerosene type	Jet A-1
F-40*	Wide-Cut type	MIL-T-5624 Grade JP-4
F-44*	High-Flash Point Kerosene type	MIL-T-5624 Grade JP-5

* Fuel identified by NATO Symbols F-34, F-40, and F-44 contain a Fuel System Icing Inhibitor (FSII). (See Paragraph 1.12.)

Table 1-2. Fuels for USAF Turbojet and Turboprop Aircraft

Military and commercial fuels that may be used in turbojet and turboprop aircraft are listed below. The applicable flight manual must be consulted for limitations associated with use of alternate or emergency fuels.				
Aircraft	Engine	Fuel		
		Primary	Alternate	Emergency
A-7D	TF41-A-1/1A	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
A-10A	TF34-GE-100	JP-4, JP-5, JP-8	Jet A, Jet A-1, Jet B	None
A-37B	J85-GE-17A	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
B-1	F101-GE-100	JP-4	None	None
B-1B	F101-GE-102	JP-4	JP-5, JP-8	Automotive Gasoline
B-2	F-118-GE-100	JP-8	JP-5; Jet A & Jet A-1 (Jet A/A-1 must have MIL-PRF-25017 Corrosion Inhibitor/Lubricity Improver and MIL-DTL-85470 Fuel System Icing Inhibitor)	
B-52D/F/G	J57-P-19W/29WA/43WB	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
B-52H	TF33-P-3	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
B/EB-57B/C/E	J65-W-5F	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
B-57F	TF33-P-11A & J60-P-9	JP-4	None	JP-8, JP-5, Jet A, Jet A-1, AVGAS
FB-111A	TF30-P-7	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-5A	TF39-GE-1/1A	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-6A	PT6A-20	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-9A/C	JT8D-9A	JP-4/Jet B	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-12A	PT6A-38/41	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-21A	TFE 731-2-2B	Jet A	Jet A-1, JP-8, Jet B, JP-4, JP-5	AVGAS
C/AC/DC/RC-130A/D/S	T56-A-9C/9D	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C/DC/EC/MC/WC-130B/E	T56-A-7B/15	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C/AC/DC/HC/WC-130H/N/P	T56-A-15	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS

Table 1-2. Fuels for USAF Turbojet and Turboprop Aircraft - Continued

Aircraft	Engine	Fuel		
		Primary	Alternate	Emergency
C-131H	501-D13H	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C/EC/KC/ RC-135 Series	J57-P-59	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-135A, EC-135A/G/L, KC-135D/Q, NC-135A, NKC-135A	J57-P-59	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-135B/C, RC-135S/W/X, TC-135S/W, WC-135B	TF33-P-5	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
EC-135C/J, RC-135U/V	TF33-P-9	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-135E, EC-135E/H/N/K/ P/Y, KC-135E, NKC-135E	TF33-PW-102	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-135FR, KC-135R	F108-CF-100	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C/EC/RC/ WC-135 Series	TF33-P-5/9	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-137B/C	JT3D-3B	JP-5	JP-8, Jet A, Jet A-1, Jet B, JP-4	AVGAS
C-140A/B	J60-P-5A/B	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
C-141A	TF33-P-7/7A	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
E-3A	TF33-PW-100	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
E-4A/B	CF6-50E	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	None
F/RF-4 Series	J79-GE-15/17	JP-4	JP-8, JP-5, Jet A, Jet A-1, Jet B	AVGAS
F/RF-5A/B	J85-GE-13	JP-4	JP-8, Jet A, Jet A-1	JP-5
F/RF-5E/F ¹	J85-GE-21	JP-4	None	JP-8, JP-5, Jet A-1
F/RF-5E/F ²	J85-GE-21	JP-8	JP-4, JP-5	Jet A-1
F-15A/B/C/D	F100-PW-100	JP-4	JP-5, JP-8, Jet A-1, Jet A, Jet B	None
F-15A/B/C/D/E	F100-PW-220	JP-4	JP-5, JP-8, Jet A, Jet A-1, Jet B	None
F-16A/B/C/D	F100-PW-200	JP-4	JP-5, JP-8, Jet A-1, Jet A, Jet B	None

Table 1-2. Fuels for USAF Turbojet and Turboprop Aircraft - Continued

Aircraft	Engine	Fuel		
		Primary	Alternate	Emergency
F-16A/B/C/D	F100-PW-220	JP-4	JP-5, JP-8, Jet A, Jet A-1, Jet B	None
F-100D/F	J57-P-21A/B	JP-4	JP8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F/RF-101 Series	J57-P-13/55	P-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F/TF-102A	J57-P-23A	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F-105B/D/F/G	J75-P-17	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F-106A/B	J75-P-17	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F/EF-111A/D/E/F	TF30-P-3/9/100	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
F-117A	F404-GE-F1D2	JP-4	JP-8, JP-5, Jet A-1, Jet B	None
KC-10A	CF6-50C2	JP-4	Jet B, Jet A-1, Jet A, JP-5, JP-8	JP-7, AVGAS
TH/UH-1F/P	T58-GE-3	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	None
HH-1H	TF53-L-13B	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
UH-1N	T400-CP-400	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	None
CH/HH-3B/C/E	T58-GE-1/5	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	None
CH/HH-53B/C	T64-GE-7/7A	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
OV-10A	T76-G-10/12	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
T-33A	J33-A-35/35A	JP-4	Jet B, AVGAS – Lowest Grade Available	JP-8, JP-5 Jet A-1, Jet A
T-37B	J69-T-25/25A	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
T-38A/B	J85-GE-5	JP-4	JP-8, JP-5, Jet A-1, Jet B, Jet A (with FSII)	AVGAS
T-39A/B/F	J60-P-3/3A	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
T-43A	JT8D-9A	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
UV-18B	PT6A-27	JP-4	JP-8, JP-5, Jet A-1, Jet A, Jet B	AVGAS
¹ When the minimum fuel flow adjustment is set for JP-4.				
² When the minimum fuel flow adjustment is set for JP-8.				

Table 1-3. Fuel Characteristics

Property	MIL-T-5624		MIL-T-83133		ASTM-D-1655		MIL-G-5572
	JP-4	JP-5	JP-8	Jet B	Jet A-1	Jet A	100/130
Specific Gravity at 60°F (MIN)	0.751	0.788	0.775	0.7507	0.7753	0.7753	—
Specific Gravity at 60°F (MAX)	0.802	0.845	0.840	0.8017	0.8398	0.8398	—
Specific Gravity at 60°F (typical) ¹	0.769	0.817	0.805	0.769	0.805	0.817	0.703
Density, Pounds/gallon (typical) ¹	6.4	6.8	6.7	6.4	6.7	6.8	6.0
Flash Point, MIN, °C (°F)	-29 (-20) ²	60 (140)	38 (100)	-29 (-20) ²	38 (100)	38 (100)	-32 (-25) ²
Vapor Pressure, psi (range)	2.0 – 3.0	—	—	2.0 – 3.0	—	—	5.5 – 7.0
Freezing Point, MAX, °C (°F)	-58 (-72)	-46 (-51)	-47 (-53)	-50 (-58)	-47 (-53)	-40 (-40)	-60 (-76)
Viscosity at -40°C, CS (estimated)	3.6	16.5	15	3.6	15	15	1.2
BTU per gal (MIN) ³	115,000	120,000	119,000	115,000	119,000	119,000	109,000 ⁴
BTU per pound (MIN)	18,400	18,300	18,400	18,400	18,400	18,400	18,700
Fuel System Icing Inhibitor	yes	yes	yes	(Optional for Commercial Fuels)	(Optional for Commercial Fuels)		no
Corrosion Inhibitor	yes	yes	yes	(Permitted by Agreement)	(Permitted by Agreement)		(Optional)
Conductivity Additive	yes	no	yes	(Generally Included Outside United States)	(Generally Included Outside United States)		no

¹ Typical average for fuels procured since 1970 in Continental U.S.A.² Typically measured values, no specification requirement stated.³ Value based on minimum fuel specific gravity from specification and reported to three significant figures.⁴ Value based on typical fuel specific gravity.

1.7 FUEL USE LIMITATIONS.

- a. General – use of any fuel is limited to operations where the temperature of the fuel remains above the freezing point. Slush (particles of frozen fuel) is formed at the freezing point and as the temperature is lowered, the liquid fuel will be converted to a solid state. Slush formations can cause blockage of fuel filters, pumps, and lines, resulting in engine flame-out. Engine restarts under such conditions become practically impossible.
- b. Alternate Fuel Limitations – use of an alternate fuel may necessitate the observance of special precautions. The appropriate aircraft flight manual must be consulted for unique precautions. In general, the freezing point (see [Table 1-3](#)) of some fuels limits use at flight conditions where the stagnation temperature approaches the freeze point of the fuel (see [Figure 1-2](#)). Aircraft not equipped with fuel temperature gauges will not operate for an appreciable period at altitudes where the stagnation temperature is within 3°C (6°F) above the fuel freezing temperature. Further, special maintenance procedures may be required for ground starting at temperatures approaching the freezing point of the fuel. Consult the appropriate aircraft technical manual for these procedures.

1.8 DETERMINATION OF FUEL TEMPERATURE.

Fuel temperatures are determined directly on aircraft having fuel temperature gauges. On aircraft temperature gauges but having an Outside Air Temperature (OAT) gauge, the indicated OAT is equivalent to the stagnation temperature and these aircraft should not be operated for an appreciable period at flight conditions where the indicated OAT is within 3°C (6°F) above the fuel freezing temperature. For aircraft not equipped with either type of temperature gauge, the same operational restriction as above applies using the stagnation temperature determined from [Figure 1-2](#) for the actual flight conditions being experienced based on a temperature for cold or standard atmosphere as considered most appropriate. Flight manuals should be consulted for specific operating instructions for flights scheduled in areas of extremely low air temperature.

1.9 COMMERCIAL TURBINE ENGINE FUELS.

When military fuels are not available, commercial fuels may be used as suitable replacement fuels (see [Table 1-2](#)). Commercial fuels have higher freeze points than JP-4 and the specifications do not require FSII or corrosion inhibitor. A conductivity additive is generally included in fuels procured outside of the United States. Precautionary procedures will be accomplished when using commercial fuel. Commercial turbine fuels conform to Specification D-1655 established by the American Society for Testing and Materials (ASTM) for the following types:

- a. Jet A is a kerosene type fuel similar to JP-8, but having a maximum freezing point of -40°C (-40°F). The specification for Jet A does not require corrosion or icing inhibitors.
- b. Jet A-1 is a kerosene type fuel similar to JP-8, but the specification for Jet A-1 does not require corrosion or icing inhibitors.

CAUTION

When using a fuel other than JP-4, it may be necessary to manually adjust fuel controls of turbine engines to avoid exceeding engine operating limits, particularly RPM and EGT. Applicable flight manuals and engine technical orders should be consulted for specific operation and adjustment instructions when using alternate fuels.

- c. Jet B is a fuel similar to JP-4 but has a maximum freeze point of -50°C (-58°F). The specification for Jet B does not require corrosion or icing inhibitors.

1.10 LUBRICITY OF FUEL.

Military fuel specifications require the addition of corrosion inhibitors. The corrosion inhibitors provide added lubricity. Commercial jet fuel specifications do not require the addition of lubricity additives (corrosion inhibitors). Refer to the applicable aircraft technical order for restrictions involving use of commercial jet fuels that do not contain fuel system corrosion inhibitor. When aviation gasoline is used in jet engine aircraft, 3% lubricating oil, Specification MIL-L-22851, Type II, will be added to improve its lubricity characteristic. Oil, Specification MIL-L-22851, can normally be mixed with AVGAS for this use by adding the required quantity of oil into the fuel tank prior to fueling the aircraft with AVGAS. Where fuel or oil temperatures are colder than 4°C (40°F), the oil will be mixed with 25% aviation gasoline prior to adding it to the aircraft fuel tank. This may be done in a bucket, drum, or other suitable container.

1.11 FUEL MIXING.

For turbojet and turboprop engines, it is permissible to mix different grades (JP-4, JP-5, or JP-8) of military fuels in aircraft fuel tanks. The aircraft flight manual should be consulted for operating instructions when fuels are mixed. Generally, the aircraft operating parameters for the most restrictive fuel in the mixture will be followed. When commercial jet fuels are mixed with JP-4 fuel, the freezing point of the mixture may be determined from the charts contained in [Figure 1-1](#).

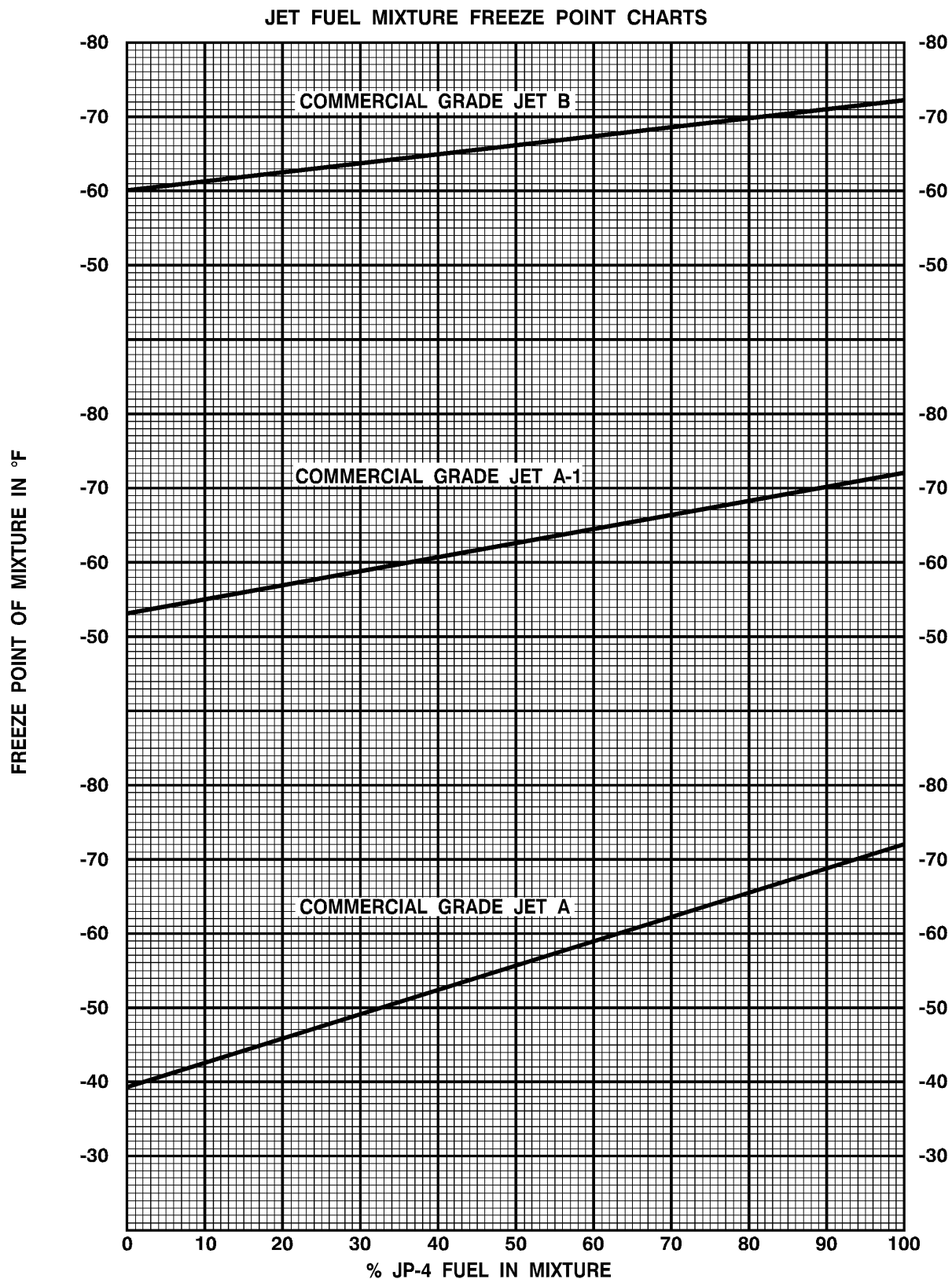


Figure 1-1. Jet Fuel Mixture Freeze Point Charts

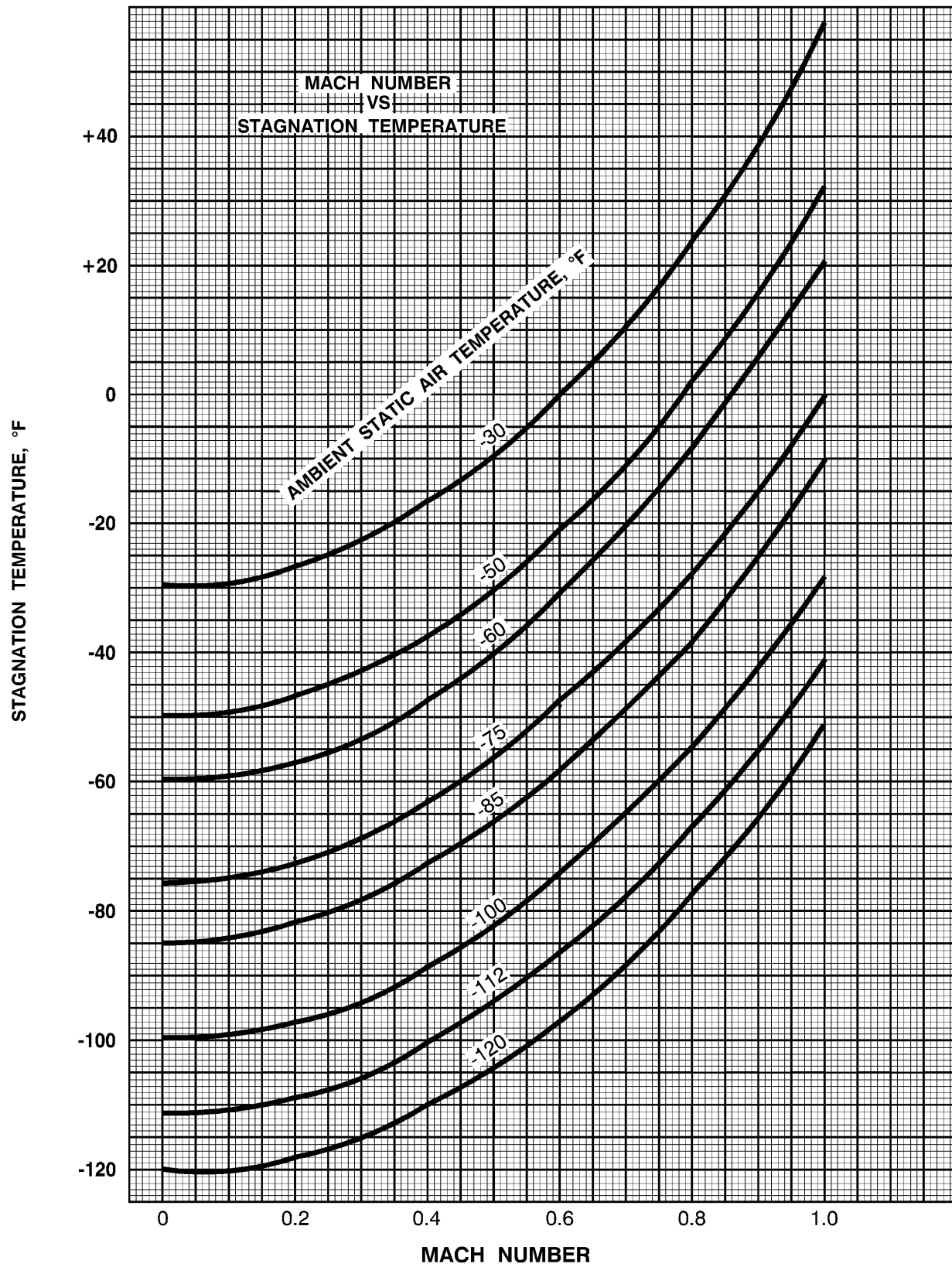


Figure 1-2. Stagnation Temperature Chart

1.12 USE OF FUELS NOT CONTAINING FUEL SYSTEM ICING INHIBITOR (FSII).

JP-4, JP-5, and JP-8 fuels contain an icing inhibitor. When using any other alternate or emergency fuel, particular care should be taken to assure that the sump drainage procedures are strictly complied with to eliminate possible water contamination. Flight crews should be especially aware of required actions in the event of fuel system icing when using fuels other than JP-4, JP-5, and JP-8.

1.13 FUEL SERVICED UNDER K INTO-PLANE SERVICING CONTRACTS.

Jet fuel, regardless of the type or grade, serviced to USAF aircraft under service contracts may or may not contain fuel system icing inhibitor. Specific information concerning the airports which service fuel under U.S. government Into-Plane contracts as reported by the Defense Logistics Agency (DFSC-OD) is listed in the DoD FLIGHT INFORMATION PUBLICATION (ENROUTE) — SUPPLEMENTS, published by Defense Mapping Agency Aerospace Center (DMAAC).

CHAPTER 2

FUELS FOR ARMY AIRCRAFT

2.1 PURPOSE.

The purpose of this chapter is to provide USAF activities with a fuels listing for U.S. Army aircraft. This chapter should be consulted before refueling Army aircraft if doubt exists as to the correct grade of fuel required.

Table 2-1. Fuels for Army Aircraft, Turbine Engines — Fixed Wing Aircraft

Aircraft	Engine	Fuel		
		Army Standard	Alternate	Emergency
CH-47D	T55-L-712, T55-GA-714A	JP-8	JP-4 & JP-5, Jet A, Jet A-1, Jet B	100LL (Low Lead) AVGAS
MH-47E	T55-L-714	JP-4	JP-5, JP-8, Jet A, Jet A-1	¹
AH-64A	T700-GE-701, T700-GE-701C	JP-4, JP-5, JP-8	Jet A, Jet B, Jet A-1	—
AH-64D	T700-GE-701, T700-GE-701C	JP-4, JP-5, & JP-8	Jet A, Jet B, and Jet A-1	¹
UH-60A&L	T700-GE-700, T700-GE-701C	JP-8 (NATO F-34), Jet A-1	JP-5 (NATO F-44), JP-4 (NATO F-40), Jet A, and Jet B	¹
MH-60K	T700-GE-701C	JP-4 (NATO F-40)	JP-5 (NATO F-44), JP-8 (NATO F-34)	¹
OH-58A&C	T63-A720	JP-4, Jet B, JP-5, JP-8, Jet A, and Jet A-1		AVGAS (MIL-G-5572) without Tricresyl Phosphate (TCP) ²
OH-58D	T703-AD-700A (250-C30R), 250-C30R/3	JP-8 & Jet B	JP-5, Jet A, & Jet A-1	None Approved
AH-6J, MH-6J, A/MH-6J	250-C30	JP-8, F-34	JP-4 (NATO F-40), JP-5 (NATO F-44)	AVGAS (MIL-G-5572) without Tricresyl Phosphate (TCP)
¹ No Emergency Fuels listed.				
² The current Aviation Gasoline (AVGAS) specification is ASTM D910.				

Table 2-2. Fuels for Army Aircraft, Turbine Engines — Rotary Wing Aircraft

Aircraft	Engine	Fuel		
		Army Standard	Alternate	Emergency
C-12R, C-12T3, & C-12F3	PT6A-42	JP-8/Jet A-1	JP-5/Jet A or JP-4/Jet B	¹
RC-12G & H	PT6A-41	JP-4/Jet B	JP-5/Jet A	AVGAS
RC-12N, P, & Q	PT6A-67	JP-8/Jet A-1	JP-5/Jet A/JP-4/Jet B	AVGAS
RC-12K & D	PT6A-41 (RC-12D), PT6A-67 (RC-12K)	JP-4/Jet B	JP-5/Jet A/JP-8/Jet A-1	AVGAS
RU-21H	T74-CP-700	JP-4	JP-5	AVGAS
U-21G	T74-CP-700	JP-4	JP-5	AVGAS
RC-7	PT6A-50	JP-4	—	AVGAS
C-23 SHERPA ²	PT6A-65AR	Jet A, Jet B, Jet A-1, JP-4, JP-5, JP-8		¹
UC-35 Cessna Citation ³	PW535A	Jet A, Jet A-1, Jet A-2, Jet B, JP-4, JP-5, and JP-8 ²		AVGAS (MIL-G-5572), all grades permitted for a max of 50 hours or 3500 gallons between overhauls ⁴
¹ No Emergency Fuels listed. ² Data taken from commercial Flight Manual. ³ Data taken from the Cessna Flight Manual. ⁴ CAUTION — These fuels except for JP-4, JP-5, & JP-8 require Fuel System Icing Inhibitor.				

CHAPTER 3

FUELS FOR NAVY AIRCRAFT

3.1 PURPOSE.

The purpose of this chapter is to provide USAF activities with a fuels listing for U.S. Navy aircraft. As per the U.S. Navy's request, this chapter lists generic fuel statements that would cover Navy/Marine Corps aircraft instead of an aircraft/fuel listing.

1. Authorized primary fuels for all Navy and Marine Corps aircraft: JP-5, JP-8.
2. JP-8+100 is not authorized for all Navy and Marine Corps aircraft.
3. Authorized Alternate Fuels for all Navy and Marine Corps Aircraft: Jet A, Jet A-1.
4. Authorized Emergency Fuels: Individual aircraft NATOPS manuals must be consulted to determine authorized emergency fuels by aircraft type.

